

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of claims:

Claim 1. (Withdrawn) A glutamic acid receptor protein having the following properties:

(A) it has a transmembrane domain and an intracellular domain common to those of type 4 metabotropic glutamic acid receptor protein, and

(B) it has an extracellular domain by about 316 or 327 amino acid residues shorter than that of the type 4 metabotropic glutamic acid receptor protein.

Claim 2. (Withdrawn) The glutamic acid receptor protein according to claim 1, wherein the protein is expressed in rat small intestine and large intestine.

Claim 3. (Withdrawn) The glutamic acid receptor protein according to claim 1, wherein the protein comprises the amino acid sequence shown in SEQ ID NO: 7 or the amino acid sequence consisting of amino acids numbers 12 to 584 in the amino acid sequence shown in SEQ ID NO: 7.

Claims 4-6 (Canceled)

Claim 7. (Withdrawn) A method of screening an agonist, an antagonist, or an allosteric modulator of glutamic acid, comprising the steps of reacting the glutamic acid receptor protein according to claim 1 with a substance that binds to the protein in the presence of a test substance, and detecting inhibition or promotion of the reaction.

Claim 8. (Withdrawn) A method of screening an agonist of glutamic acid comprising the steps of reacting a glutamic acid receptor protein claim 1 and a test substance, and detecting the reaction.

Claim 9. (Withdrawn) A method according to claim 7, wherein the cell harboring a DNA which encodes the glutamic acid receptor protein or a membrane fraction prepared from the cell is used as the glutamic acid receptor protein.

Claim 10. (Withdrawn) A method according to claim 9, wherein the inhibition or promotion of the binding is detected by a second messenger generated by the glutamic acid receptor protein.

Claim 11. (Withdrawn) A method according to claim 8, wherein the cell harboring a DNA which encodes the glutamic acid receptor protein or a membrane fraction prepared from the cell is used as the glutamic acid receptor protein.

Claim 12. (Withdrawn) A method according to claim 11, wherein inhibition or promotion of the binding is detected by a second messenger generated by the glutamic acid receptor protein.

Claim 13. (Withdrawn) An antibody that specifically binds to the glutamic acid receptor protein according to claim 1.

Claim 14. (Withdrawn) A method of producing a drug for modulating a second messenger generated by binding glutamic acid to a glutamic acid receptor, comprising the steps of:

reacting the glutamic acid receptor protein according to claim 1 with a substance that binds to the protein in the presence of a test substance and detecting inhibition or promotion of the reaction to screen an agonist, an antagonist, or an allosteric modulator of glutamic acid; and
preparing a pharmaceutical composition containing the agonist, antagonist, or allosteric modulator of glutamic acid obtained in the reacting step as an active ingredient.

Claim 15. (Withdrawn) A method of producing a drug for modulating a second messenger generated by binding glutamic acid to a glutamic acid receptor, comprising the steps of:

reacting the glutamic acid receptor protein according to claim 1 with a test substance and detecting the reaction to screen an agonist of glutamic acid; and
preparing a pharmaceutical composition containing the agonist of glutamic acid obtained in the reacting step as an active ingredient.

Claims 16-27 (Canceled).

Claim 28 (New). An isolated DNA molecule that encodes a glutamic acid receptor protein, comprising:

an amino acid sequence represented by SEQ ID NO: 7 or an amino acid sequence represented by amino acid residues 12 to 584 of SEQ ID NO: 7,

wherein the glutamic acid receptor protein comprises

a transmembrane domain and an intracellular domain common to those of brain type 4 metabotropic glutamic acid receptor protein, and

an extracellular domain that is about 316 or 327 amino acid residues shorter than the extracellular domain of the brain type 4 metabotropic glutamic acid receptor protein.

Claim 29 (New). An isolated DNA molecule that encodes a glutamic acid receptor protein and is hybridizable with a DNA molecule having a nucleotide sequence represented by SEQ ID NO: 6 under conditions of 60°C, 1 x SSC, and 0.1 % SDS, wherein the glutamic acid receptor protein comprises

a transmembrane domain and an intracellular domain common to those of brain type 4 metabotropic glutamic acid receptor protein, and

an extracellular domain that is about 316 or 327 amino acid residues shorter than the extracellular domain of the brain type 4 metabotropic glutamic acid receptor protein.

Claim 30 (New). The DNA molecule of claim 28, wherein the glutamic acid receptor protein is expressed in rat small intestine and large intestine.

Claim 31 (New). The DNA molecule of claim 29, wherein the glutamic acid receptor protein is expressed in rat small intestine and large intestine.

Claim 32 (New). A cell comprising a DNA molecule that encodes the glutamic acid receptor protein of claim 28 in an expressible form.

Claim 33 (New). A cell comprising a DNA molecule that encodes the glutamic acid receptor protein of claim 29 in an expressible form.

Claim 34 (New). A cell comprising a DNA molecule that encodes the glutamic acid receptor protein of claim 30 in an expressible form.

Claim 35 (New). A cell comprising a DNA molecule that encodes the glutamic acid receptor protein of claim 31 in an expressible form.

Claim 36 (New). A method of producing glutamic acid receptor protein or producing a cell comprising the glutamic acid receptor protein, comprising:

cultivating a cell transformed with a DNA molecule encoding the glutamic acid receptor protein of claim 28 in an expressible form, in a medium to produce the glutamic acid receptor protein.

Claim 37 (New). A method of producing glutamic acid receptor protein or a cell comprising the glutamic acid receptor protein, comprising:

cultivating a cell transformed with a DNA molecule encoding the glutamic acid receptor protein of claim 29 in an expressible form, in a medium to produce the glutamic acid receptor protein.

Claim 38 (New). A method of producing glutamic acid receptor protein or a cell comprising the glutamic acid receptor protein, comprising:

cultivating a cell transformed with a DNA molecule encoding the glutamic acid receptor protein of claim 30 in an expressible form, in a medium to produce the glutamic acid receptor protein.

Claim 39 (New). A method of producing glutamic acid receptor protein or a cell comprising the glutamic acid receptor protein, comprising:

cultivating a cell transformed with a DNA molecule encoding the glutamic acid receptor protein of claim 31 in an expressible form, in a medium to produce the glutamic acid receptor protein.